



IB MYP Year 5

## Year 10 Extended Mathematics

Assessment #8

**PATTERNS IN PROBABILITY**

Unit Question: How do we remember what we have learned? Name: Nivian Wu Y10 Pace  
Area of Interaction: ATL Teachers: Ms. Li, Mr. So, and Mr. Wong  
Date: May 31, 2013 Time Allowed: Single Lesson  
Concept Statement: You will always find previous knowledge useful in future situations.

The objective of this task is to find a pattern in probability in a table tennis game using knowledge from both this year and last year.

**PREPARATION:**

- ◆ From year 9, revise what you have learned about **probability**.
- ◆ From year 10, revise what you have learned about **sequences** and **series**.

**INSTRUCTIONS:**

- ◆ Show all **steps** and proper **units** on the **lined paper** provided.
- ◆ Submit **your own work**. Any copying or other cheating, will automatically receive a 0.
- ◆ You are allowed to use non-electronic **dictionary**.
- ◆ **Calculators** are allowed.

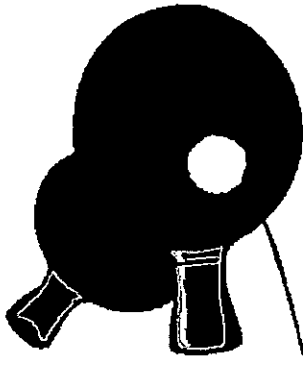
**ASSESSMENT:**

- ◆ Read **all the questions** first, then the **criteria descriptors** and **task-specific clarifications** carefully before you start your work. This will give you a clear understanding of what is required and what a high quality piece of work for this task must include. This way you give yourself the best chance of achieving the highest levels in this task.
- ◆ This task assesses Criterion B.

**CRITERION B: INVESTIGATING PATTERNS**

Achievement level	Task Specific Rubric	IBO Published Descriptor	Student's Self-Evaluation
0	The student does not reach a standard described by any of the descriptors given below.	The student does not reach a standard described by any of the descriptors given below.	3 (0-8)
1-2 Do Maths	You are able to answer the early questions, and order your answers in a way that reveals patterns.	The student applies, with some guidance, mathematical problem-solving techniques to recognize simple patterns.	
3-4 General Rule	You develop appropriate systematic methods in order to answer the questions. The results you get help you to suggest a mathematical rule using a, b and N.	The student applies mathematical problem-solving techniques to recognize patterns, and suggests relationships or general rules.	Teacher's Final Grade
5-6 Test it	You continue with the questions, and use questions 6 and 7 as a check on your findings.	The student selects and applies mathematical problem-solving techniques to recognize patterns, describes them as relationships or general rules, and draws conclusions consistent with findings.	
7-8 Prove it	You are able to justify or prove your answer to question 6.	The student selects and applies mathematical problem-solving techniques to recognize patterns, describes them as relationships or general rules, draws the correct conclusions consistent with the correct findings, and provides justifications or proofs.	

# PATTERNS IN PROBABILITY



I play table tennis against a friend. The probability I win a point is  $a$  and the probability she wins a point is  $b$ . These probabilities stay constant throughout the game.

(**Important Note:**  $a \neq b$  While two table tennis players can have the same skill level, in general one player is better. This will be important in question 7.)

**A game is won only when a player wins two consecutive points.**

*So, for example, I might win a game where the point rallies go: WLWLWLWLWW (that is, I win the game because I won the final 2 points).*

**In the following, simplify your answers wherever possible.**

1. Write a simple relationship between  $a$  and  $b$ .
2. What is the probability I win the first two points (and so win the game)?
3. What is the probability the game lasts for 3 points and I win?
4. What is the probability the game lasts for 4 points and I win?

*(You may like to repeat question 4 for when the game lasts for 5 points, or 6, or 7 and so on.)*

5. Describe mathematically any patterns you find in these probabilities.
6. What is the probability, in terms of  $a$  and  $b$ , that the game lasts for  $N$  points and I win?
7. If  $a = 0.6$ , show that the probability I win a game in 5 points or less is approximately 0.625.
8. Write a **proof** or **justification** of your answer to question 6.

~ End of Assessment ~



Vivian Wu  
Y10 Peace

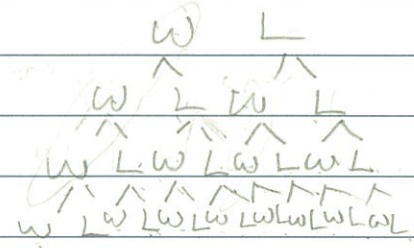
1.  $a \neq b$

$a = 0.6$

$b = 0.4$

$a + b = 1 \quad 0.6 + 0.4 = 1$

2.  $\frac{1}{4} \times 100$   
 $= 0.25 \times 100$   
 $= 25\%$



3.  $\frac{1}{8} \times 100\%$   
 $= 0.125 \times 100\%$   
 $= 12.5\%$

4.  $\frac{1}{16} \times 100\%$   
 $= 0.0625 \times 100\%$   
 $= 6.25\%$

5.  $N$  represents the total of all the possibilities in each row  
 $P = \frac{1}{n} \times 100\%$

6.  $P = \frac{1}{n} \times 100\%$

7.  $P = \frac{1}{n} \times 100\%$

8.  $P = \frac{1}{n} \times 100\%$

9.  $P = \frac{1}{n} \times 100\%$

10.  $P = \frac{1}{n} \times 100\%$

11.  $P = \frac{1}{n} \times 100\%$

12.  $P = \frac{1}{n} \times 100\%$

13.  $P = \frac{1}{n} \times 100\%$